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DEVELOPMENT OF NUTRI BESAN COCO COOKIES

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ABSTRACT

The entitled product "Towards sustainability: incorporating ghee residue and whey water in the preparation of fortified buckwheat biscuits" is carried out for the development of a nutritive and proteinous snack. by utilizing ghee residue, it is a rich source of fat and proteins, milk sugars, flavoring properties and antioxidant properties. Buck wheat flour is naturally a kernel from the flowering plant which is known as the most common millet.it is gluten free and it is an excellent replacement of all-purpose flour. It is a good source of fibre and energy. Whey water is used for the replacement of water which also increases the quality and nutritive value of the product. This product has sustainable development goals, to reduce global wastage of food and provide healthy diet alternatives for people with malnutrition, coeliac disease, and diverticular diseases. to make an impact on developing sustainable food towards health and the development of the food industry. this product increases immune health, aids digestion, promotes heart health, and eye vision and provides instant energy. The developed and finalized product will then be evaluated for physio-chemical, textural, functional and sensory attributes.

KEYWORDS: Ghee Residue, Buckwheat Flour, Wheat

INTRODUCTION

NutriBasenCoco Cookies were developed as a healthier alternative to traditional cookies, which are often high in sugar and unhealthy fats. These new cookies incorporate nutrient-dense flours like besan (gram flour), wheat flour, peanut flour, and coconut flour, along with chocochips and nuts, to boost their nutritional profile with protein, fiber, healthy fats, antioxidants, vitamins, and minerals. The study aimed to understand the development of these cookies, analyze their nutritional content, and see if consumers liked them through sensory testing. The idea is to contribute to the growing area of functional foods and offer a more nutritious snack option. Modern consumers are increasingly looking for healthier snacks that taste good and offer nutritional benefits. Regular cookies often lack fiber, protein, and essential nutrients, contributing to health issues. NutriBasenCoco Cookies aim to address this by using a blend of flours known for their nutritional advantages. Each flour in the recipe plays a specific role. Besan is high in protein and fiber and has a low glycemic index. Wheat flour provides structure. Peanut flour offers protein, healthy fats, and antioxidants. Coconut flour is rich in fiber and medium-chain triglycerides. Chocochips and nuts enhance taste and add antioxidants, vitamins, and minerals. Baking soda and salt are used for texture and flavor. Developing these cookies involves balancing the different flours, especially the gluten-free ones, to achieve the right dough consistency and texture. Wheat flour is used in moderation for structure. The goal is to create a functional food that meets consumer demand for protein, fiber, and overall health benefits, appealing to various groups looking for nutritious snacks. Using plant-based ingredients and by-products also aligns with sustainable food practices. The recipe can also be adapted for gluten-free or diabetic-friendly versions. Sensory evaluation is crucial for consumer acceptance. The inclusion of chocochips and nuts aims to improve appearance, texture, and flavor. Further tests on the cookies would include analyzing their physical and chemical properties, shelf life, and nutritional content to ensure they meet safety standards and consumer preferences.

MATERIALS AND METHODS

Cookies were formulated using a blend of besan, wheat, coconut, and peanut flours, with jaggery as a natural sweetener. Standard baking procedures were followed. Nutritional analysis was conducted for protein, fat, fiber, and moisture. A 9-point hedonic scale was used for sensory evaluation among semi-trained panelists.

Ingredients	Variation-1	Variation-2	Variation-3
Besan (Gram Flour)	60g	50g	55g
Wheat Flour	50g	60g	55g
Peanut Butter	40g	35g	45g
Jagger Powder	35g	30g	32g
Coconut Powder	25g	30g	28g

Cardamom Powder	2g	2g	2g
Chopped Nuts	20g	18g	20g
Baking Powder	5g	5g	5g
Salt	1g	1g	1g

Tabale No: 1 Sample Formulations

Flow chart for the preparation of nutri besan coco cookies

Weigh all the ingredients accurately.
↓
Whisk the peanut butter until it becomes light and creamy.
↓
Add jaggery powder and continue whisking in the same direction.
↓
Gradually add the dry ingredients while whisking continuously.
(Besan, Wheatflour, Coconut powder, Cardamom powder, Bakingpowder,Salt)
↓
Mix until a uniform dough is formed.
↓
Roll out the dough and cut into desired shapes.
↓
Bake the cookies at 170–180 °C for 12–15 minutes.
↓
Cool the cookies and store them the air tight containers.

PHYSICO-CHEMICALANALYSIS

Moisture: The moisture analyzer determines content by heating a 3-5g sample on a clean pan at around 105°C, measuring weight loss until stabilization. The device then displays the moisture percentage, dry weight, and drying time (e.g., 1.85%, 4.909g, 120s). After cooling, the pan is cleaned for the next rapid and accurate analysis, crucial for food quality and shelf life.

Fat: The Soxhlet method precisely determines fat content by extracting lipids from a 2-5g ground cookie sample using petroleum ether in a Soxhlet apparatus for 5-6 hours. The solvent is evaporated, and the remaining fat in the flask is dried at 105°C and weighed. The fat content percentage is calculated using the initial flask weight (W1), the flask weight after fat extraction (W2), and the sample weight (W3) with the formula: W3W2−W1×100. This standardized technique ensures reproducible fat analysis in food matrices.

Carbohydrate: Carbohydrate content in besan coconut cookies, mainly from besan, wheat flour, jaggery, peanut butter, and coconut powder, is determined using a modified FSSAI method. A 10g sample is dissolved, filtered, and hydrolyzed with HCl to convert complex carbohydrates to reducing sugars, then neutralized. This solution is titrated against boiling Fehling's solution until a brick-red precipitate forms, and the volume of extract used is recorded to calculate the total carbohydrate content using a glucose equivalence factor. This analysis is vital for nutritional information and regulatory compliance.

Protein: Protein content in besan coconut cookies, primarily from besan and peanut butter, is determined using the Kjeldahl method. A 1-2g sample is digested with sulfuric acid and a catalyst, then neutralized with NaOH, and the released ammonia is distilled into boric acid. The ammonia is quantified by titration with 0.1N HCl, and the nitrogen percentage is converted to protein content by multiplying by a factor of 6.25. The expected protein range is 10-14%, making these cookies a potentially high-protein, plant-based snack.

RESULTS AND DISCUSSION

As per the sensorial analysis, Variation 2 was optimized among the three variations, as it received the highest overall acceptability score compared to Variations1 and 3. This was due to its appreciable color, flavor, taste, texture, and appearance. The overall acceptability score of Variation-2 was also found to be close to that of the control sample. The results of the sensorial analysis are presented in Table No 1

The colour of the optimized product (Variation2) received the highest score among the three variations and was closest to the control. Colour is a crucial visual sensory at tribute that plays a significant role in consumer appeal. It is the first characteristic that attracts the consumer and can influence their perception and appetite for the food product.

Sensory Attributes	Control	Variation-1	Variation-2	Variation-3
Colour	9	9	8.5	7
Taste	9	9	9	7
Appearance	9	8	9	8
Flavor	9	9	9	7
Texture	9	8.5	8.5	7
Overall				
Acceptability	9	8.5	9	7

Table 2: Sensory Attributes of Besan Coconut Cookies

Results of Sensorial Analysis

Taste is a fundamental attribute influencing consumer preferences and overall product acceptability. It refers to the detection of basic modalities like sweet, sour, salty, bitter, and

umami by the gustatory system. It directly impacts the sensory pleasure derived from the product. The taste of the optimized besan coconut cookie (Variation2) received the highest score compared to Variations1 and 3 , indicating superior palatability and consumer preference.

Flavor is the critical attribute that profoundly influences consumer acceptability and preference. It encompasses the combined sensory perceptions of taste, smell, and mouthfeel. The flavor of the optimized cookie sample obtained the highest score compared to Variations1 and 3, reflecting its appealing balance of ingredients such as cardamom, coconut, and peanut butter.

Appearance, including colour, is a significant attribute that shapes consumers 'initial perception and emotional response to the product. The appearance of the optimized cookie scored higher than Variations1 and 3 suggesting it had the most visually appealing texture, shape, and colour, contributing to enhanced first impressions. Over all acceptability is a composite measure of a product's sensory attributes including appearance, tastecolour, flavor, consistency, andaroma. It represents the cumulative hedonic response reflecting the product's ability to meet or exceed consumer expectations. The optimized besan coconut cookie showed the highest overall acceptability score, indicating strong consumer satisfaction and preference. This high acceptability suggests a greater potential for consumer repeat purchases and positive word-of-mouth promotion.

Physico- Chemical Analysis

The physicochemical evaluation of the developed besan coco nut cookies revealed that the optimized formulation demonstrated superior nutritional properties when compared to the control sample. The optimized cookies exhibited not ably higher protein and fiber content, primarily due to the inclusion of nutrient dense ingredients like besan (gram flour), peanut butter, and coconut powder, which contribute to overall nutritional enhancements. The moisture content in the optimized sample was significantly lower than that of the control. This reduction in moisture not only contributed to a crispier and more desirable cookie texture but also played a vital role in extending shelf life by reducing the risk of microbial spoilage. Additionally, the lower acidity in the optimized cookies enhanced the flavor profile, offering a more balanced and palatable taste.

A reduced moisture level also allowed the natural flavors of the ingredients— such as the nutty richness of besan and peanut butter and the subtle sweetness of coconut and jaggery to become more pronounced. These Physico -chemical characteristics directly supported the findings of the sensory evaluation, indicating enhanced consumer satisfaction and preference. The detailed findings of the physico-chemical properties are presented in Table4.1, highlighting parameters such as moisture, protein, fat, fiber, ash, and carbohydrates. These results align with earlier studies (e.g., HeshamA. Ismailetal.,2020), which emphasize the functional benefits of incorporating traditional and plant-based ingredients in baked products to improve both nutritional value and textural quality

S.no	Parameters	Control	Sample 1	Sample 2	Sample 3
1	Moisture (%)	25.60	20.20	21.35	19.10
2	Fat (%)	12.20	14.15	13.50	18.20
3	Ph	5.65	4.10	6.10	7.15
4	Fiber (%)	1.80	7.20	4.70	8.10
5	Protein (%)	5.80	5.30	8.90	3.15
6	Carbohydrate (%)	53.55	59.15	50.45	58.20
7	Ash (%)	0.85	3.15	1.10	3.20

Table 3: Physico-Chemical Properties of Besan Coconut Cookies

CONCLUSION

The study successfully demonstrated the development of a nutrient-rich, fiber-enhanced cookie—Nutri Besan Coco Cookies—using besan, wheat flour, peanut butter, coconut powder, and jaggery. Among the formulations tested, Variation 2 emerged as the most promising based on both sensory attributes and physico-chemical analysis. Nutri Besan Coco Cookies possess significantly higher protein and fiber content compared to conventional cookies. Jaggery serves as a healthier alternative to sugar, contributing to both nutrition and flavor. Sensory acceptability remained high, especially in the optimized formulation, indicating good market potential. Lower moisture content suggests improved shelf stability. This product meets the growing consumer demand for functional and nutritious snacks without compromising taste, making it a viable addition to the health food segment. Further research could focus on storage stability, packaging, and potential fortification with additional micronutrients.

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